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Branch of Forest Insect and Disease Prevention and Control
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Mountain Pine Beetle Trend and
Impact Study Near Spring Creek
Park, Bridger National Forest

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This is one of a series of reports on a study to measure the trend and impact of the mountain pine beetle, Dendroctonus ponderosae Hopkins, on stand structure of predominantly lodgepole pine stands. The study area is located on the West Slope of the Wind River Range near Spring Creek Park, Bridger National Forest, Wyoming. Yearly attrition has been recorded on a yearly basis over a 400-acre area since 1968. Mountain pine beetle caused mortality was recorded on 85 permanent variable plots using a basal area factor (BAF) of $\frac{1}{5}$. Green stand was measured on 26 of the 85 plots using a BAF of 10.

Losses near Spring Creek Park are part of an extensive outbreak along the Wind River Range. The infestation originated in the low elevation fringe type stands and later spread into susceptible timber at higher elevations (Figures 1 and 2). In the study area, tree killing increased each year from 1968 through 1970. A significant decrease in mortality occurred in 1971 and again in 1972. A further decline is expected in 1973.

Green stand structure prior to the infestation was predominantly lodgepole pine (84 percent). The balance of the stand consists of limber pine (8 percent), Douglas-fir (6 percent), Engelmann spruce (1.5 percent), and subalpine fir (0.5 percent). Total live stems per acre were 261.7. Over the life of the infestation, 10.3 percent of the lodgepole pine and 12.0 percent of the limber pine have been killed by the mountain pine beetle. These losses represent 9.6 percent of the stand. Cumulative losses prior to 1968 were 5.96 lodgepole pine and 0.09 limber pine per acre. Lodgepole pine mortality in trees per acre was 2.03 in 1968, 4.41 in 1969, 6.62 in 1970, 2.94 in 1971, and 0.68² in 1972 (Figure 3 and Table 1). Limber pine mortality was 0.85 in 1968, 0.75 in 1969, 0.60 in 1970, 0.25 in 1971, and 0 in 1972 (Figure 4 and Table 2).

The yearly trend during this outbreak follows the same pattern as that recorded in a similar study in Yellowstone National Park.^{3/} The peak level of tree killing occurred during the fourth year in both

1/ See 1971 report for a detailed description of sampling methods.

2/ Subject to correction in 1973.

3/ Parker, D.L. 1972. Trends of a Mountain Pine Beetle Outbreak in Yellowstone National Park. 1966 to 1972. Unpub. report. U.S. Department of Agriculture, Forest Service, Division of Timber Management, Ogden, Utah, 5 pp., Illus.

infestations. The major difference between these infestations is the level of mortality. During this study, 25.2 trees per acre (9.6 percent) were lost while during the same number of years, 55.2 trees per acre (26 percent) were killed in Yellowstone. Some physical and geographical differences between these two stands follow:

Area	Spring Creek Park	Yellowstone N.P.
Stand Structure		
Trees 5-13 inches	198.5/acre	199.3/acre
Trees > 13 inches	63.2/acre	12.1/acre
Stand Composition		
% Host	92	100
% Nonhost	8	0
Elevation	8,800 feet	6,400 feet

In addition to the above trend data, emergence data by year and diameter class were collected during the infestation. The purpose was to determine the relationship between the number of emerging beetles and annual host depletion. These data will be analyzed and reported on at a later date.

Data collection will continue until the infestation subsides.

A P P E N D I X

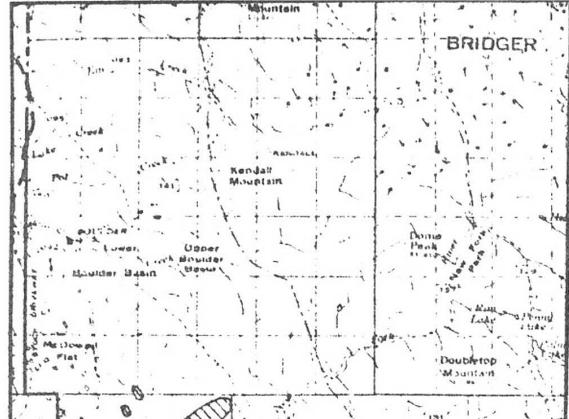


Figure 1. Generalized areas of mountain pine beetle infestation during early stage of the outbreak 1/.

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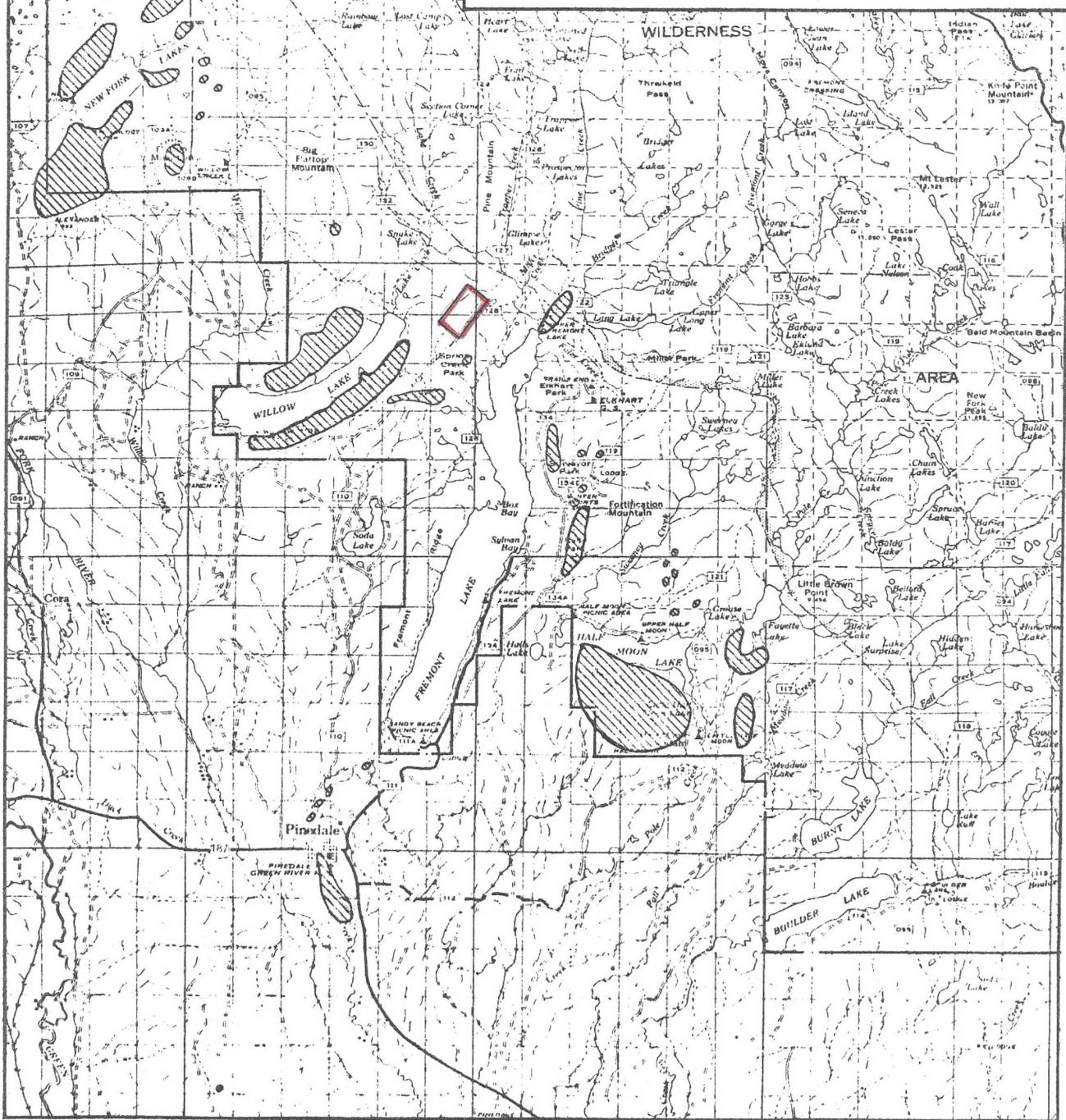
Infested area



Study area



1/ Taken from 1966 aerial survey.



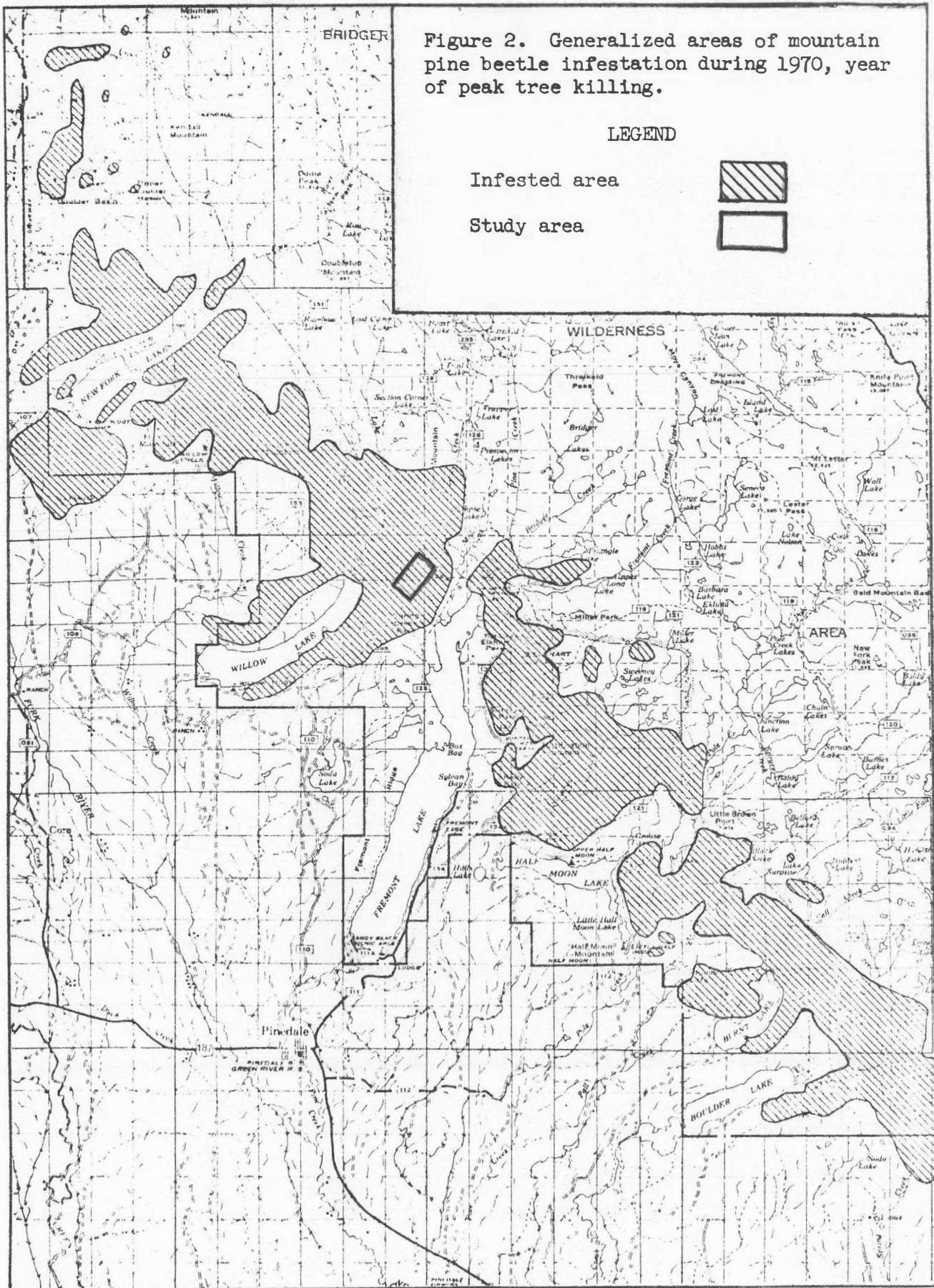


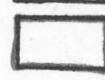
Figure 2. Generalized areas of mountain pine beetle infestation during 1970, year of peak tree killing.

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Infested area



Study area



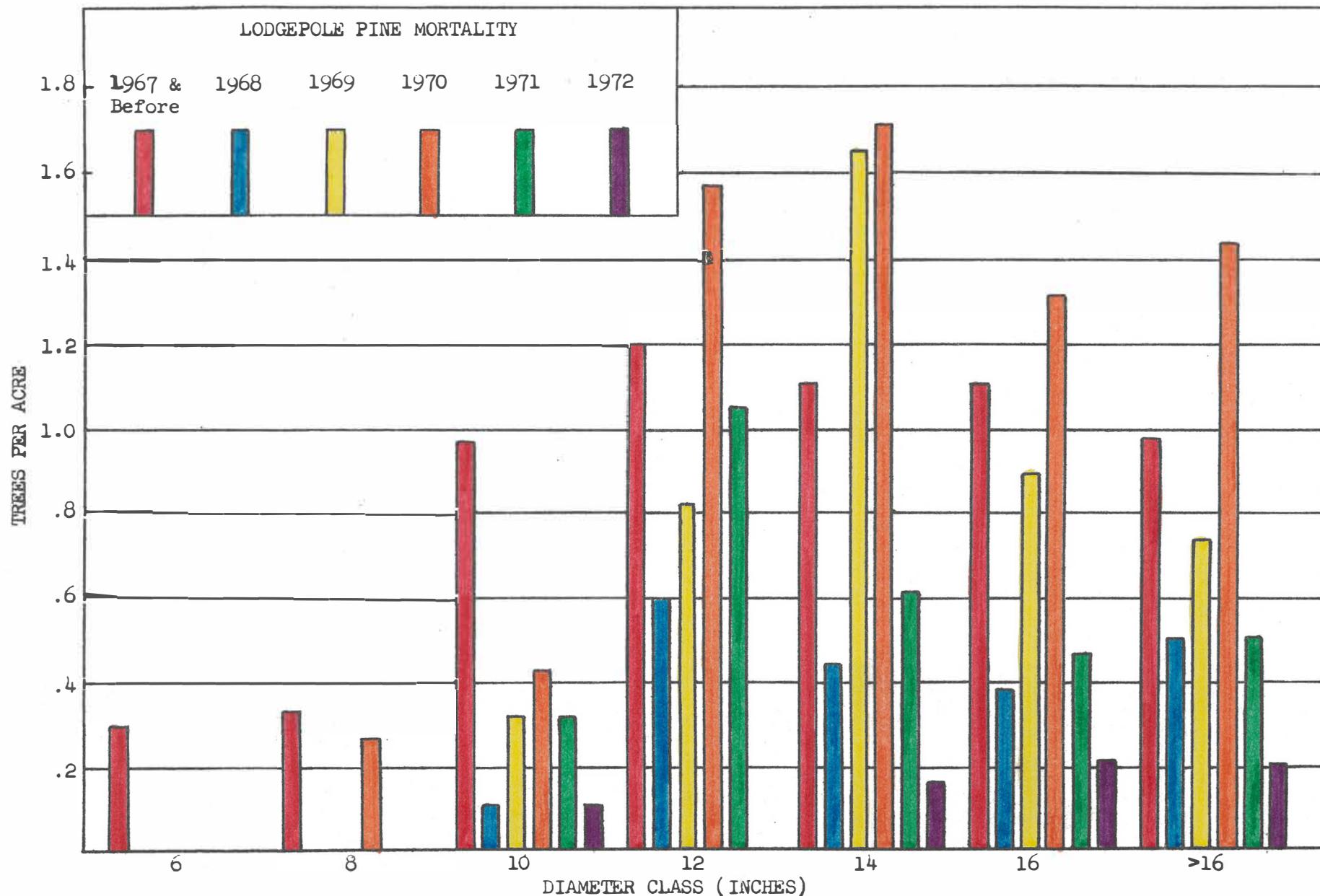


Figure 3. Mountain pine beetle caused mortality of lodgepole pine by year and diameter class near Spring Creek Park, Bridger National Forest.

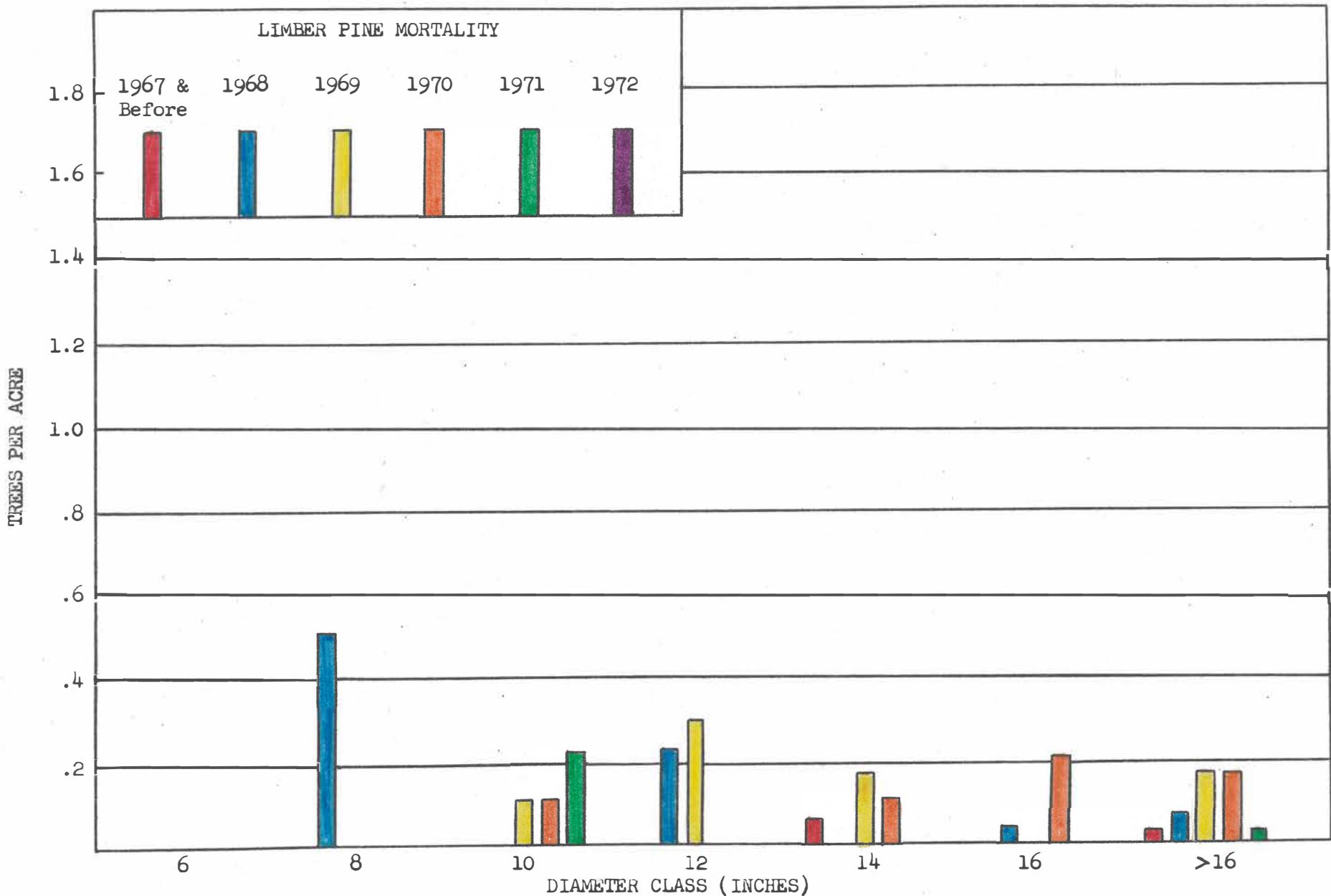


Figure 4. Mountain pine beetle caused mortality of limber pine by year and diameter class near Spring Creek Park, Bridger National Forest.

Year	Dead Lodgepole Pine/Acre								Cumulative Mortality
	6	8	10	12	14	16	> 16	Total	
1967 & Before	0.30	0.34	0.97	1.20	1.10	1.10	0.97	5.98	5.98
1968	--	--	0.11	0.60	0.44	0.38	0.50	2.03	8.01
1969	--	--	0.32	0.82	1.65	0.89	0.73	4.41	12.42
1970	--	0.17	0.43	1.57	1.71	1.31	1.43	6.62	19.04
1971	--	--	0.32	1.05	0.61	0.46	0.50	2.94	21.98
1972	--	--	0.11	--	0.16	0.21	0.20	0.68	22.66
Total	0.30	0.51	2.16	5.16	5.78	4.27	4.33	22.66	

Table 1. Mountain pine beetle caused mortality of lodgepole pine by year and diameter class near Spring Creek Park, Bridger National Forest.

Year	Dead Limber Pine/Acre								Cumulative Mortality	
	Diameter Class									
	6	8	10	12	14	16	>16	Total		
1967 & Before	--	--	--	--	0.06	--	0.03	0.09	0.09	
1968	--	0.51	--	0.23	--	0.04	0.07	0.85	0.94	
1969	--	--	0.11	0.30	0.17	--	0.17	0.75	1.96	
1970	--	--	0.11	--	0.11	0.21	0.17	0.60	2.29	
1971	--	--	0.22	--	--	--	0.03	0.25	2.54	
1972	--	--	--	--	--	--	--	--	2.54	
Total	--	0.51	0.44	0.53	0.34	0.25	0.47	2.54		

Table 2. Mountain pine beetle caused mortality of limber pine by year and diameter class near Spring Creek Park, Bridger National Forest.